

APPENDIX F

**Technical Memorandum from the Data Review Meeting
February 2, 2006**

TECHNICAL MEMORANDUM

Date: March 30, 2006

To: United State Environmental Protection Agency
Kids First/Lake County Community Health Program Work Group

From: Performance Standards Work Group

RE: California Gulch Data Review for Operable Unit 9 - Residential

The Performance Standards Work Group (PSWG) was tasked by the Kids First/Lake County Community Health Program Work Group (Work Group) to develop a step-wise approach to further evaluate and potentially identify the lead sources, or combination of lead sources, that may be determinant factors in children's blood lead levels within the residential portions of the California Gulch Site. In reviewing comments received by the 2003 Independent Review Panel (IRP), the Work Group recommended this activity to evaluate the specific comments regarding the observation that the calculated percentage of the participants with blood lead levels greater than 10 and 15 µg/dL (P10 and P15), respectively, had not significantly declined over time, particularly in Statistical Unit 1 [prior to 2003].

The PSWG determined that a screening level assessment of the correlation between paint (identified by the IRP as the possible dominant exposure that may be inhibiting the further decline of P10 and P15 values) and blood lead levels was an appropriate first step in the process. Additional evaluation of all trends and paired data collected by the program was also performed to address comments from the IRP. On February 2, 2006 the PSWG met with the Work Group and members of the community to present the findings of this additional data evaluation. A list of the figures, diagrams and tables presented at the meeting is presented at the end of this memorandum.

The presentation to the Work Group included a review of community blood lead level trends and a variety of graphical data presentations and data summaries intended to explore and evaluate the relationship between blood lead levels and environmental data from the sources investigated by the program. The Fisher Exact Test was used in the screening level assessment to further evaluate the contribution of lead-base paint exposure at the site. Figures from the *2004 Annual Report*, additional bi-variate plots and box and whisker diagrams were created to evaluate the most likely determinant factors of lead exposure. Simplified multi-variate plots were also created using the 1994-2004 data. Finally, the PSWG presented data comparing the observed changes in blood lead levels for children whose blood lead level had exceeded 10 ug/dl at some time during their testing period and who had at least two tests. This comparison evaluated the average, and range of, change in blood lead levels of children grouped into several categories, including all children within OU9, those residing at properties where remediation was performed after their first test but before their last test, no action properties, and those children who had contact only with the blood lead program (children who reside outside of the OU9 site boundaries).

The following bullets summarize the major findings and conclusions of the additional data evaluation and the discussions at the meeting:

- Since the time of the IRP's review in 2003, the P10 and P15 values for SU1 have declined and in fact are approaching levels established as the Performance Standards for the program that define achievement of the Program's Remedial Action Objectives.
- Central tendency indices of the blood lead data, including geometric mean, arithmetic mean, and median continue to decline over time for all of OU9, SU1 and within individual areas of the Site. The observed data do indicate slight increases in some of these values year to year, but the overall trend is in decline.
- Additional data presented regarding community blood lead levels for 2000-2004 indicate that SU1 and in particular Area D continue to have the highest frequency of children with elevated blood lead levels within the site. For example, over this time period, approximately 50% of the children tested reside in SU1, but EBL children within SU1 account for 92% of the total number of EBL children within the Site. Approximately 27% of the children tested reside in Area D, but EBL children within Area D account for 65% of the total number of EBL children within the Site.
- Screening level bi-variate analysis of blood lead versus paint lead (Fisher Exact Test) did not detect a statistically significant correlation between increased incidence of elevated blood lead levels (EBL) and any of the paint exposure metrics evaluated. However, this does not mean that lead-based paint may not be an important exposure source in some cases, only that it does not seem to be the dominant factor in accounting for elevated blood lead levels in area children.
- As has been the case in the past, bi-variate plots of blood lead versus environmental lead data show that there is no observable correlation or relationship between individual media lead concentrations and blood lead levels. This lack of a demonstrable correlation may in part be due to a combined effect from many different variables (e.g., soil, paint, dust, age, as well as behavioral differences) and the inability of bi-variate analysis to account for multiple contributing factors simultaneously, thereby weakening the likelihood of detecting a significant correlation for any one media. Alternative data presentation techniques displaying the range of observed blood lead levels at varying ranges of lead concentrations in soil and paint do, however, show that the median blood lead level and range of blood lead levels tend to increase with higher soil and paint lead levels. This observation supports the hypothesis that higher environmental lead concentrations do represent a greater exposure risk.
- Because of the lack of correlation between environmental lead levels and blood lead levels it is difficult to assess the appropriateness of the site specific trigger levels established for the program. Alternative statistical methods such as multivariate or structural analysis would be necessary to pursue this issue further.
- Relationships between blood lead and environmental media were further explored

through the evaluation of a number of subsets, or stratification, of the paired data set. These included the evaluation of relationships over different periods of time, the evaluation of the relationship using blood lead data above or below the median, and evaluation of the relationship and distribution of the blood lead data at different ranges of lead concentrations in the media tested. In addition, the effect of lead in combinations of media was explored through a simplistic visual presentation of the data. These evaluations also did not reveal any statistically significant or predictable correlation. Although, as noted above, each media may contribute alone or in combination along with other factors to an individual child's exposure to lead.

- The data presented comparing the changes in blood lead levels of EBL children indicate a slightly greater average decrease in blood lead levels among children with elevated blood lead levels, when a response action is taken to address environmental media with lead concentrations above the trigger levels, compared to education alone. However, the data sets used in this comparison are relatively small and additional information and analysis would likely be needed to make any definitive conclusions regarding the effectiveness of certain elements of the program.
- Overall, the data evaluation supports previous conclusions that lead in a variety of media (soil, paint, dust) contribute to EBLs in children in OU9, with no one dominant source identified.

Based on the data evaluation performed, the PSWG does not believe that any further evaluation or multi-variate analysis is warranted at this time. The PSWG did recommend that the Program continue to focus its efforts and resources on evaluating and addressing potential lead exposures with Statistical Unit 1 and Area D, in particular, until the performance goals are met.

At the February 2nd meeting several additional data evaluation requests were made. These include a basic statistical summary of mouthing behavior data at a child's first test collected through family surveys, and additional information on environmental and other demographic data at properties where both blood lead data and environmental data are available and where remedial actions were performed during blood lead testing of elevated blood lead children.

The following is a list of figures, diagrams and tables presented by the PSWG:

- 1994-2004 central tendencies for the geometric mean, the arithmetic mean and the median
- 2002-2004 blood lead data distribution for Statistical Unit 1 and Area D, all tests and first time tests
- 1994-2004 demographic characteristics over time
- 1999-2004 blood lead program participation
- Comparison of 1994-1999 with 2000-2004 area of residence (at first time test) for

- evaluated blood lead levels (EBLs) by percentage and total number of children
- 1994-2004 Blood Lead Levels by Area
- 1994-2004 OU9 Blood Lead Levels by Age Group (in years)
- 1994-2004 Average 0-6 Inch Soil Lead vs. First-test Blood Lead Level (bi-variate plot)
- 1994-2004 Blood Lead Levels by Average 0-6 inch Soil Lead Levels (box and whisker diagram)
- 1994-2004 Maximum Paint Lead Concentration (poor condition) vs. First-test Blood Lead Level (bi-variate plot)
- 1994-2004 Statistical Unit 1 - Maximum Paint Lead Concentration (poor condition) vs. First-test Blood Lead Level (box and whisker diagram)
- 1994-2004 Statistical Unit 1 - Maximum Paint Lead Concentration (poor condition) vs. First-test Blood Lead Level (bi-variate plot)
- 1994-2004 Statistical Unit 1 - Maximum Paint Lead Concentration (poor condition) vs. First-test Blood Lead Level (box and whisker diagram)
- 1994-2004 Statistical Unit 1 - Paint Lead Concentration (poor condition) vs. First-test Blood Lead Level (box and whisker diagram)
- 1994-2004 Operable Unit 9 Average 0-2 Inch Soil Lead vs. First-test Blood Lead Level (bi-variate plot)
- 1994-2004 Operable Unit 9 Average 0-2 Inch Soil Lead vs. First-test Blood Lead Level above and below the Median Level (bi-variate plot)
- Operable Unit 9 - Comparison of 1994-1999 with 2000-2004 Average 0-2 Inch Soil Lead vs. First-test Blood Lead Level (bi-variate plot)
- 1994-2004 Operable Unit 9 - Average 0-2 Inch Soil Lead above and below 3000 ppm vs. First-test Blood Lead Level (bi plot)-variate
- 1994-2004 Area D Average 0-2 Inch Soil Lead vs. First-test Blood Lead Level (bi-variate plot)
- 1994-2004 Operable Unit 9 - Maximum Paint Lead Concentration (poor condition) vs. First-test Blood Lead Level above and below the Median Level (bi-variate plot)
- 1994-2004 Operable Unit 9 – Main Living Area Dust Lead vs. First-test Blood Lead Level above and below the Median Level (bi-variate plot)
- 1994-2004 Operable Unit 9 Average 0-2 Inch Soil Lead vs. Average Dust Lead (bi-variate plot)
- 1994-2004 Operable Unit 9 Maximum Paint Lead Concentration (poor condition) vs. Average Dust Lead (bi-variate plot)
- Split Set Comparison of Blood Lead Data above and below the median vs. Environmental Data (table)
- 1994-2004 Operable Unit 9 - Average 0-6 Inch Soil Lead vs. Blood Lead Level (box and whisker diagram)
- 1994-2004 Operable Unit 9 – Average Dust Lead vs. Blood Lead Level (box and whisker diagram)
- 1994-2004 Operable Unit 9 – Maximum Paint in Poor Condition vs. Blood Lead Level (box and whisker diagram)

- 1994-2004 Operable Unit 9 - Average 0-6 Inch Soil Lead vs. Blood Lead Level vs. Paint Hazard (multi-variate plots)
- 1994-2004 Area D - Average 0-6 Inch Soil Lead vs. Blood Lead Level vs. Paint Hazard (multi-variate plots)
- 1994-2004 Operable Unit 9 – Average Main Living Area Dust vs. Blood Lead Level vs. Paint Hazard (multi-variate plots)
- 1994-2004 Operable Unit 9 – Average Main Living Area Dust vs. Blood Lead Level vs. Average 0-6 Inch Soil Lead (multi-variate plots)
- Drop in Blood Lead Levels after First Test for Elevated Blood Lead Children (table)
- Change in Blood Lead Levels from First to Last Test for Elevated Blood Lead Children (box and whisker diagram)